

Fidel Barrera-Cruz

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Research Interests

- Graph Theoretic Algorithms
- Graph Theory
- Discrete and Computational Geometry
- Order Theory

Current position

Sept 1 – Nov 30, 2014 **Member, Institute for Mathematics and its Applications, University of Minnesota**, Minneapolis, MN, USA.
Annual Program in Discrete Structures: Analysis and Applications

Education

- 2010–2014 **PhD in Mathematics (Combinatorics and Optimization)**, *University of Waterloo*, Waterloo, ON, Canada.
Thesis: Morphing planar triangulations. Under supervision of Prof. Penny Haxell.
- 2008–2010 **Master of Mathematics (Combinatorics and Optimization)**, *University of Waterloo*, Waterloo, ON, Canada.
Thesis: On Schnyder’s Theorem. Under supervision of Prof. Penny Haxell.
- 2001–2005 **Bachelor in Applied Mathematics**, *Universidad Autónoma del Estado de Hidalgo*, Pachuca, Hgo, México.
Thesis: Implementing graph theoretic algorithms. Under supervision of Prof. Rubén A. Martínez-Avendaño.

Journal Publications

- [1] Fidel Barrera-Cruz and Penny Haxell. “A Note on Schnyder’s Theorem”. In: *Order* 28 (2011), pp. 221–226.

Publications in refereed conference proceedings

- [1] Fidel Barrera-Cruz, Penny Haxell, and Anna Lubiw. “Morphing Planar Graph Drawings with Unidirectional Moves”. In: *Mexican Conference on Discrete Mathematics and Computational Geometry*. 2013, pp. 57–65. URL: <http://arxiv.org/abs/1411.6185>.

- [2] Fidel Barrera-Cruz, Penny Haxell, and Anna Lubiw. "Morphing Schnyder drawings of planar triangulations". In: *Graph Drawing - 22nd International Symposium, GD 2014, Würzburg, Germany, September 24–26, 2014, Revised Selected Papers*. To appear.
- [3] Fidel Barrera-Cruz, Therese Biedl, Martin Derka, Stephen Kiazzyk, Anna Lubiw, and Hamideh Vosoughpour. "Turning Orthogonally Convex Polyhedra into Orthoballs". In: *Proceedings of the 26th Canadian Conference on Computational Geometry, CCCG 2014, Halifax, Nova Scotia, Canada, August 11–13, 2014*. To appear. URL: <https://projects.cs.dal.ca/cccg2014/proceedings/papers/paper37.pdf>.

In progress

- [1] Soroush Alamdari, Patrizio Angelini, Fidel Barrera-Cruz, Timothy M. Chan, Giuseppe Di Battista, Fabrizio Frati, Penny Haxell, Anna Lubiw, Maurizio Patrignani, Vincenzo Roselli, Sahil Singla, and Bryan T. Wilkinson. *Morphing Planar Graph Drawings with a Polynomial Number of Steps*. In preparation.
- [2] Fidel Barrera-Cruz, Penny Haxell, and Anna Lubiw. *Morphing Schnyder drawings of planar triangulations*. In preparation. URL: <http://arxiv.org/abs/1411.6186>.

Awards and scholarships

- 2014 **Best Presentation Award**, *Morphing Schnyder drawings of planar triangulations*, 22nd International Symposium on Graph Drawing.
- 2013 **Best TA Award**, *Department of Combinatorics and Optimization*, University of Waterloo.
- 2010–2014 **Conacyt scholarship**, *awarded for PhD studies*.
- 2008–2010 **Conacyt scholarship**, *awarded for Master's studies*.
- 2005 **ACM ICPC**, *Honorable mention in the Central America Programming Contest*. Team member of Universidad Autónoma del Estado de Hidalgo.
- 2005 **Bachelor Level Regional Programming Contest**, *Third place*. Organized by the Mathematics Research Center at Universidad Autónoma del Estado de Hidalgo.
- 2004 **ZERO-ONE Programming Contest**, *Second place*. Organized by Computer Engineering department at Universidad Autónoma del Estado de Hidalgo .

Talks

- September, 2014 **Morphing Schnyder drawings of planar triangulations**, *22nd International Symposium on Graph Drawing*, University of Würzburg, Bavaria, Germany.

- November, 2013 **Morphing Planar Graph Drawings with Unidirectional Moves**, *Mexican Conference on Discrete Mathematics and Computational Geometry*, Oaxaca, México.
- September, 2012 **A Short Proof of Schnyder's Theorem**, *AMS Fall Eastern Sectional Meeting*, Rochester Institute of Technology, New York, U.S.A..
- August, 2011 **Drawing Planar Graphs à la Schnyder**, *10 years of the Bachelor in Applied Mathematics program*, Universidad Autónoma del Estado de Hidalgo, Hidalgo, México.
- May, 2010 **Dimension of Incidence Posets and Planarity, an Alternate Approach**, *Ontario Combinatorics Workshop*, Brock University, Ontario, Canada.
- October, 2007 **Implementing Graph Theoretical Algorithms**, *XL Mexican Mathematical Society Conference*, Universidad Autónoma de Nuevo León, Nuevo León, México.

Mini courses

- June, 2008 **Writing documents using \LaTeX , an introduction.**
Offered during the 2nd Summer School in Biomathematics, organized by the Mathematics Research Center at Universidad Autónoma del Estado de Hidalgo .
- April, 2007 **Introductory \LaTeX course.**
Offered during the week celebrating the Basic Ciencias and Engineering Institute at Universidad Autónoma del Estado de Hidalgo.

Experience

Teaching

- Winter 2014 **Instructor**, *University of Waterloo*, Waterloo, ON, Canada.
Instructor for first year linear algebra course.

2009–2013 **Teaching Assistant**, *University of Waterloo*, Waterloo, ON, Canada.
Duties included giving lectures, holding tutorial sessions, grading assignments and exams. Teaching assistant for the following courses:

Fall 2013 Graph Theory;
Spring 2013 Introduction to Graph Theory;
Winter 2013 Coding Theory;
Fall 2012 Introduction to Graph Theory;
Spring 2012 Introduction to Combinatorics;
Winter 2012 Deterministic Operations Research Models;
Fall 2011 Introduction to Graph Theory;
Winter 2011 Applied Cryptography;
Fall 2010 Calculus 2 for Honours Mathematics;
Spring 2010 Calculus 3 for Honours Mathematics;
Winter 2010 Discrete Mathematics for Engineers;
Fall 2009 Calculus 1 for Engineering;
Spring 2009 Calculus 2 for Engineering;
Winter 2009 Calculus 3 for Honours Mathematics.

Research

Spring 2014 **Research Assistant**, *University of Waterloo*, Waterloo, ON, Canada.
Worked under supervision of Prof. Joseph Cheriyan on Algorithms and Spectral Graph Theory.

Computer Programming

2009–2011 **Sage developer**, *contributed code to the Sage graph theory component*.

Service

July 2014 **Guest speaker and panelist**, *California State University Channel Islands*,
Mathematics Research Experience for Undergraduates.

Referee, *for the journals Order and ACM Transactions on Algorithms*.

Other

2007–2008 **Computer laboratory administrator**, *Universidad Autónoma del Estado de Hidalgo*, Pachuca, Hgo, México.

In charge of computer laboratory, providing technical assistance to students and researchers at the Mathematics Research Center.

Languages

English **Fluent**

Second Language.

Spanish **Fluent**

Native Language.

Computer skills

Programming languages C, C++, Java, Python

Operating systems GNU/Linux, MacOS, Windows

Mathematics software Maple, Matlab, Sage

Office suites and typesetting \LaTeX , LibreOffice, MS Office

References

Available upon request.

November 30, 2014